TCS 218

Tactical Control System (TCS)

to

Enhanced Tactical Radar Correlator (ETRAC)

Interface Design Description

Prepared for:
Program Executive Officer, Cruise Missiles Project
and Unmanned Air Vehicles Joint Project

Prepared by:
Naval Surface Warfare Center
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TACTICAL CONTROL SYSTEM (TCS)
TO
ENHANCED TACTICAL RADAR CORRELATOR (ETRAC)
INTERFACE DESIGN DESCRIPTION

TCS 218

Table Of Contents
- TCS to ETRAC Interface Design Document

Paragraph

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1. Scope

This Interface Design Document (IDD) defines the interface between the Tactical Control System (TCS) and the Enhanced Tactical Radar Correlator (ETRAC). See Figure 1.0-1. The intent of this document is to define a system to system interface. In the event that ETRAC should decide to incorporate TCS functionality within the ETRAC, a new and separate IDD may be required.

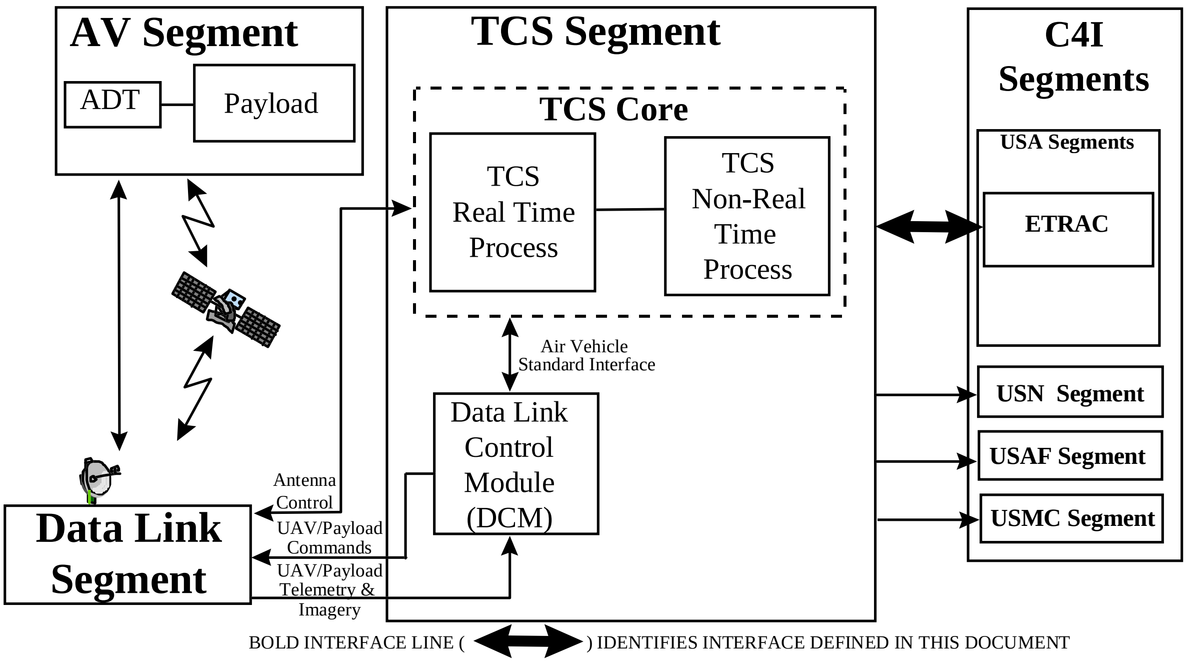

Figure 1.0-1. Top Level TCS Interface Block Diagram.

1.1 Identification

This TCS IDD Version 1.0 identifies, specifies, and establishes the baseline for the detailed interface requirements between the TCS and the ETRAC image exploitation system (Block II build 7.x) as set forth by both the TCS System/Subsystem Specification (SSS) Version 1.0 and the TCS System/Subsystem Design Description (SSDD) Version 1.0. This IDD is written to comply with TCS Operational Requirements Document (ORD) Requirement Number ORD069. This IDD specifies requirements levied on the TCS, and does not impose any requirements on the ETRAC System as addressed in this document. This IDD further specifies the methods to be used to ensure that each system interface requirement has been met. This IDD is published in accordance with Data Item Description (DID) DI-IPSC-81436, dated 941205, and modified to incorporate the qualification provisions section that is traditionally found in the Interface Requirements Specification (IRS). This IDD will be revised at the conclusion of the Program Definition and Risk Reduction period (Phase I, which ends September 1998) of the TCS program and will be re-issued in final form to be used during the follow-on TCS Engineering and Manufacturing Development period (Phase II).

1.2 System Overview

The purpose of the TCS is to provide the military services with a common command, control, data receipt, data processing, data export and dissemination capability that is interoperable with the family of all present and future tactical unmanned aerial vehicles and designated C^4I systems. These UAVs include the Tactical Unmanned Aerial Vehicle (TUAV) and the Medium Altitude Endurance (MAE) UAV (henceforth referred to as Outrider and Predator respectively), with their associated payloads. Designated C^4I and other systems that TCS will be interoperable with are detailed in paragraph 1.2.2.4 below. TCS will also be capable of receiving and processing information from High Altitude Endurance (HAE) UAVs and their associated payloads, as well as being capable of providing interoperability with future development tactical UAVs and payloads.

1.2.1 TCS Program, Phases, and UAV Interaction

The Unmanned Aerial Vehicle Joint Project Office (UAV JPO) has undertaken development of a TCS for UAVs. Design and development of the TCS will be conducted in two phases. Phase 1 is defined as the Program Definition and Risk Reduction phase, and Phase 2 is defined as the Engineering and Manufacturing Development phase in accordance with Department Of Defense Instruction (DoDI) - 5000.2R. During Phase 2, TCS Low Rate Initial Production (LRIP) will commence. Phase 1 will be a 24-month period and will demonstrate Level 1 through Level 5 interaction (as defined below) in an Incremental and Evolutionary strategy as described in accordance with MIL-STD-498. The five discrete levels of multiple UAV interaction to be provided by the TCS are:

Level 1: receipt and transmission of secondary imagery and/or data

Level 2: direct receipt of imagery and/or data

Level 3: control of the UAV payload in addition to direct receipt of imagery/data

Level 4: control of the UAV, less launch and recovery, plus all the functions of Level 3

Level 5: capability to have full function and control of the UAV from takeoff to landing.

1.2.2 Tactical Control System Overview

The TCS is the software, software-related hardware and the extra ground support hardware necessary for the control of the TUAV, the MAE UAV, and future tactical UAVs. The TCS will also provide connectivity to specific C^4I systems as outlined in paragraph 1.2.2.4. TCS will have the objective capability of receiving HAE UAV payload information. Although developed as a total package, the TCS will be scaleable to meet the user's requirements for deployment. TCS will provide a common Human-Computer Interface (HCI) for tactical airborne platforms to simplify user operations and training, and to facilitate seamless integration into the Services' joint C^4I infrastructure across all levels of interaction.

1.2.2.1 Software

The major focus of the TCS program is software. The software will provide the UAV operator the necessary tools for computer related communications, mission tasking, navigation planning, mission execution, data receipt, data processing, limited data exploitation, and data dissemination. The software will provide a high resolution computer generated graphics user interface that enables a UAV operator trained on one system to control different types of UAVs or UAV payloads with a minimum of additional training. The TCS will operate in an open architecture and be capable of being hosted on computers that are typically supported by the using Service. Software developed will be Defense Information Infrastructure Common Operating Environment (DII COE) compliant, non-proprietary, and the architectural standard for all future tactical UAVs. To the extent possible, the TCS will use standard Department of Defense (DoD) software components. TCS will provide software portability, scaleable functionality, and support for operational configurations tailored to the users' needs.

1.2.2.2 Hardware

To the extent possible, the TCS will use standard DoD hardware components in order to achieve commonality. The TCS will use the computing hardware specified by the service specific procurement contracts. Each individual service will identify TCS computing hardware, the desired level of TCS functionality, the battlefield C^4I connectivity, and the particular type of air vehicle and payloads to be operated depending upon the deployment concept and area of operations. TCS hardware must be capable of being scaled or modularized to meet varying Service needs. TCS hardware will permit long-range communications from one TCS to another, data storage expansion, access to other computers to share in processing capability, and multiple external peripherals.

1.2.2.3 System Compliance

The TCS will be developed in compliance with the following military and commercial computing systems architecture, communications processing, and imagery architecture standards:

a) DoD Joint Technical Architecture (JTA), including but not limited to:
   1. Variable Message Format (VMF)
   2. National Imagery Transmission Format (NITF)
b) DII / COE
c) Computer Open Systems Interface Processor (COSIP)
d) Common Imagery Ground/Surface System (CIGSS) Segment of Distributed Common Ground Station (DCGS)

1.2.2.4 Integration with Designated C^4I Systems

The TCS will be capable of entering DII COE compliant networks, and TCS integration with C^4I systems will be accomplished through development of interfaces that permit information exchange between the TCS and specified C^4I systems. Network interoperability will include but not be limited to:

- Advanced Field Artillery Tactical Data System (AFATDS)
- Advanced Tomahawk Weapons Control System (ATWCS)
- Air Force Mission Support System (AFMSS)
- All Source Analysis System (ASAS)
- Army Mission Planning System (AMPS)
- Automated Target Handoff System (ATHS)
- Closed Circuit Television (CCTV)
- Common Operational Modeling, Planning and Simulation Strategy (COMPASS)
- Contingency Airborne Reconnaissance System (CARS)
- Enhanced Tactical Radar Correlator (ETRAC)
- Guardrail Common Sensor/Aerial Common Sensor (ACS) Integrated Processing Facility (IPF)
- Intelligence Analysis System (IAS)
- Joint Deployable Intelligence Support System (JDISS)
- Joint Maritime Command Information System (JMCIS)
- Joint Service Imagery Processing System - Air Force (JSIPS)
- Joint Service Imagery Processing System - Navy (JSIPS-N)
- Joint Surveillance Target Attack Radar System (JSTARS) Ground Station Module/Common Ground Station (GSM/CGS)
- Modernized Imagery Exploitation System (MIES)
- Tactical Aircraft Mission Planning System (TAMPS)
- Tactical Exploitation Group (TEG)
- Tactical Exploitation System (TES)
- Theater Battle Management Core System (TBMCS)
- TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) II

The TCS will export and disseminate UAV imagery products, tactical communication messages, as well as mission plans and target coordinates. The TCS will also receive, process, and display tasking orders, and operational information from Service-specific mission planning systems.

1.2.3 ETRAC Overview

The ETRAC is an imagery exploitation system capable of receiving U-2 Advanced Synthetic Aperture Radar -2 (ASARS-2) sensor data, processing it to imagery, exploiting the imagery and disseminating the imagery to multiple users. It is also capable of navigation planning and sensor planning for the U-2 and dynamic sensor retasking of the ASARS-2. ETRAC operates at a dedicated Sensitive Compartmented Information (SCI) security level. There are two ETRAC systems, one located at XVIII Airborne Corps, Ft. Bragg, NC. and the second with the V Corps, Mainz-Finthen, Germany, although the system is currently deployed in support of Bosnian Peace Keeping efforts.

The ETRAC is a deployable sheltered system that consists of three major components, the Tactical Mission Van (TMV), the Tactical Support Van (TSV), and the remote data link Surface antenna Group (SAG). The TSV is a support and maintenance van and is not of direct interest to the TCS or the definition of the interface. The TMV contains data link equipment, the Common Advanced Synthetic Aperture Radar Processor (CSARP), an image server, and four exploitation and monitoring workstations.

The TMV is a commercial grade, custom-built all-aluminum construction, semi-trailer with air ride suspension. The trailer houses the ETRAC mission equipment and three Environmental Control Units (ECUs). The ETRAC mission equipment includes the processing server, input / output unit, storage / recording devices, all network and internal interface equipment, switches and routers, graphics server, printers, and control / exploitation workstations. All hardware, excluding the input / output unit, is Commercial-off-the-shelf (COTS). The heart of ETRAC is the CSARP, which transforms Synthetic Aperture Radar (SAR) video phase history data to digital imagery. The TMV also houses the hardware and software necessary for U-2 mission planning and mission monitoring, a Government Furnished Equipment (GFE) communications suite, and all data link equipment not located at the SAG. The van also provides workspace for three operators and one supervisor.

1.3 Document Overview

The purpose of this document is to provide the interface description between the TCS and the ETRAC. This document was developed using MIL-STD-498 (Data Item Description DI-IPSC-84136) as a guide, and is divided into the following sections:

Section 1 — Scope: Identifies the systems, interfacing entities, and interfaces addressed in this document, with a brief overview of each.

Section 2 — Referenced Documents: Lists all referenced documents applicable to this development effort.

Section 3 — Interface Design: Identifies and describes the characteristics of the interface(s) defined in this document.

Section 4	Requirement Traceability and Qualification Provisions: Defines the requirement traceability to the TCS SSDD, and also defines the qualification methods which are used to ensure that each requirement of this interface has been met.
Section 5	Notes: Provides background information regarding the specific C^4I system addressed, and a list of acronyms and abbreviations used in this document.
Appendices	As applicable to provide referenced data. For this document, Appendix A provides additional information on NITF header and image sub header. Additional Appendices may be added later.

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2. Referenced Documents

2.1 Government Documents

The following documents of the exact issue shown form part of this IDD to the extent specified herein. In the event of conflict between the documents referenced herein and the content of this IDD, the content of this IDD will be considered a superseding requirement.

2.1.1 Specifications

JROCM 011-97 7 July 1997	Operational Requirements Document for the Unmanned Aerial Vehicle (UAV) Tactical Control Segment (TCS) Version 5.0
TCS 102 30 June 1997	Tactical Control System System/Subsystem Specification (Version 1.0)
TCS 103 1 August 1997	TCS Software Requirements Specification (TCS103), Version 1.1
TCS 104 Date - TBD	Tactical Control System, System/Subsystem Design Description, Version 1.
DISA XXX.XX 31 Oct. 1996	DII/COE Baseline Specifications Version 3.0 (Series)
DII COE I&RTS January 1997	DII COE Integration and Runtime Specification, Revision 3.0
MIL-C-49292	Cable Assembly, Non-Pressure Proof, Fiber Optic Metric
MIL-C-83526	Connectors, Fiber Optic, Circular Environmental Resistance Hermaphroditic

2.1.2 Standards

Federal — None.

Military —

MIL-STD-498 5 Dec. 1994	Software Development and Documentation Standard

MIL-STD-1777 12 August 1983	Internet Protocol (IP)
MIL-STD-1778 26 October 1983	Transmission Control Protocol (TCP), Notice 1,
MIL-STD-2500A 12 Oct 1994	National Imagery Transmission Format Standard (Version 2.0)

Other Government Agency —

DoD JTA 22 August 1996	Department of Defense (DoD) Joint Technical Architecture (JTA), Version 1.0

2.1.3 Drawings

— None

2.1.4 Other Publications

Reports —

TCS 100 18 February 1997	Operational Concept Document for the TCS (Draft)
DISA/JIEO Circular 9008	NITFS Certification Test and Evaluation Program Plan
RASG-9703-XXXX 20 March 1997	Airborne Synthetic Aperture Radar Support Data Extensions (SDE) for the National Imagery Transmission Format (NITF Version 2.0) of the National Imagery Transmission Format Standards Version 0.9a

Regulations — None.

Handbooks —

CIGSS-Handbook 19 July 1995	CIGSS Acquisition Standards Handbook Version 1.0

CJCSM 6120.05 1 January 1998	Manual for Tactical Command and Control Planning Guidance for Joint Operations, Joint Interface Operational Procedures for Message Text Formats
MIL-HDBK-1300A 12 October 1994	National Imagery Transmission Format

Bulletins — None.

2.2 Non-Government Documents

The following documents of the exact issue shown form part of this IDD to the extent specified herein. In the event of conflict between the documents referenced herein and the content of this IDD, the content of this IDD will be considered a superseding requirement.

2.2.1 Specifications

— None.

2.2.2 Standards

ISO/IEC 8802-3: 1996 [ANSI/IEEE Standard 802.3, 1996 Edition]	Information technology--Local and metropolitan area networks--Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications [Ethernet Local Area Network 10BASE-T and 10BASE-F Specification]
IETF RFC0821 August 1982	Simple Mail Transfer Protocol

2.2.3 Drawings

— None.

2.2.4 Other Publications

— None.

3. Interface Design

There are multiple interfaces that can exist between TCS and ETRAC depending on the operational scenario and whether or not the systems are collocated. These interfaces may be point-to-point or networked. Coordination data, such as flight paths and sensor tasking, may be transferred using secure telephone systems or other standard communications channels.

3.1 Interface Types

When the TCS is collocated with ETRAC, the TCS will connect to the ETRAC internal router via an Imagery Support Server Environment (ISSE) Guard application over the fiber optic medium. When the systems are not collocated, a network connection such as one provided by Secret Internet Protocol (SIPRNET) or the Defense ATM Services - Collateral (DAS-C) network will be necessary. This document only addresses the collocated scenario.

3.2 Project Unique Identifier of Interface

The interface between the TCS and the ETRAC can be defined by one network interface and one telephone interface. The network interface has two different implementations to consider. The proper selection of interfaces is dictated by the operational scenario at the time. The interfaces, including data formats and communications protocols are defined in the sections below.

3.2.1 Network Interface to ETRAC

The ETRAC Concept of Operations directs all collateral and unclassified connections to interface to the ISSE Guard System to ensure the security of the ETRAC TMV. Presently, the ISSE Guard allows only 10Mbps Ethernet interface connections. A proposed upgrade will allow 100Mbps Fiber Distributed Data Interface (FDDI) in the future. However, the capability of the ISSE guard limits external interfaces to only one port (Ethernet or FDDI, but not both at the same time). This means that the primary interface to ETRAC will probably be the Ethernet unless the external collateral network (SIPRNET) is disconnected.

The TCS may be directly connected to the ISSE Guard System using its own dedicated Ethernet or FDDI link[1], or the TCS may be part of a larger Local Area Network (LAN) which in turn has a connection to the ISSE Guard System. If a direct connection is desired, then the TCS system shall be required to provide an Ethernet Network Interface Card (NIC) [C4I218001] and an FDDI NIC [C4I218002]. The Ethernet NIC should ideally support all cabling media including IEEE 10Base-5, 10Base-2, and 10Base-T. A detachable 10Base-FL transceiver shall also be required to interface to the ETRAC's fiber optic medium [C4I218003]. The FDDI NIC may be either Single Attach Station (SAS) or Dual Attach Station (DAS). DAS cards are more expensive, but incorporate an added measure of network reliability. If a LAN implementation is sought, then the network providers must ensure connectivity either via Ethernet or FDDI with the same considerations. The choice to use a LAN connection vs. direct TCS connection is arbitrary - - factors include the presence of devices that TCS may need to communicate with other than

[1] The FDDI connection is not currently an ETRAC capability, however, it is expected to be an ETRAC capability by the time the TCS and ETRAC begin collocated testing.

ETRAC, and devices that ETRAC may need to communicate with other than TCS. Implementing a LAN connection to ISSE Guard offers the greatest flexibility and does not compromise security due to the inherent safeguards integrated into the ISSE Guard System. The diagram of Figure 3.2.1-1 illustrates the TCS/ETRAC architecture.

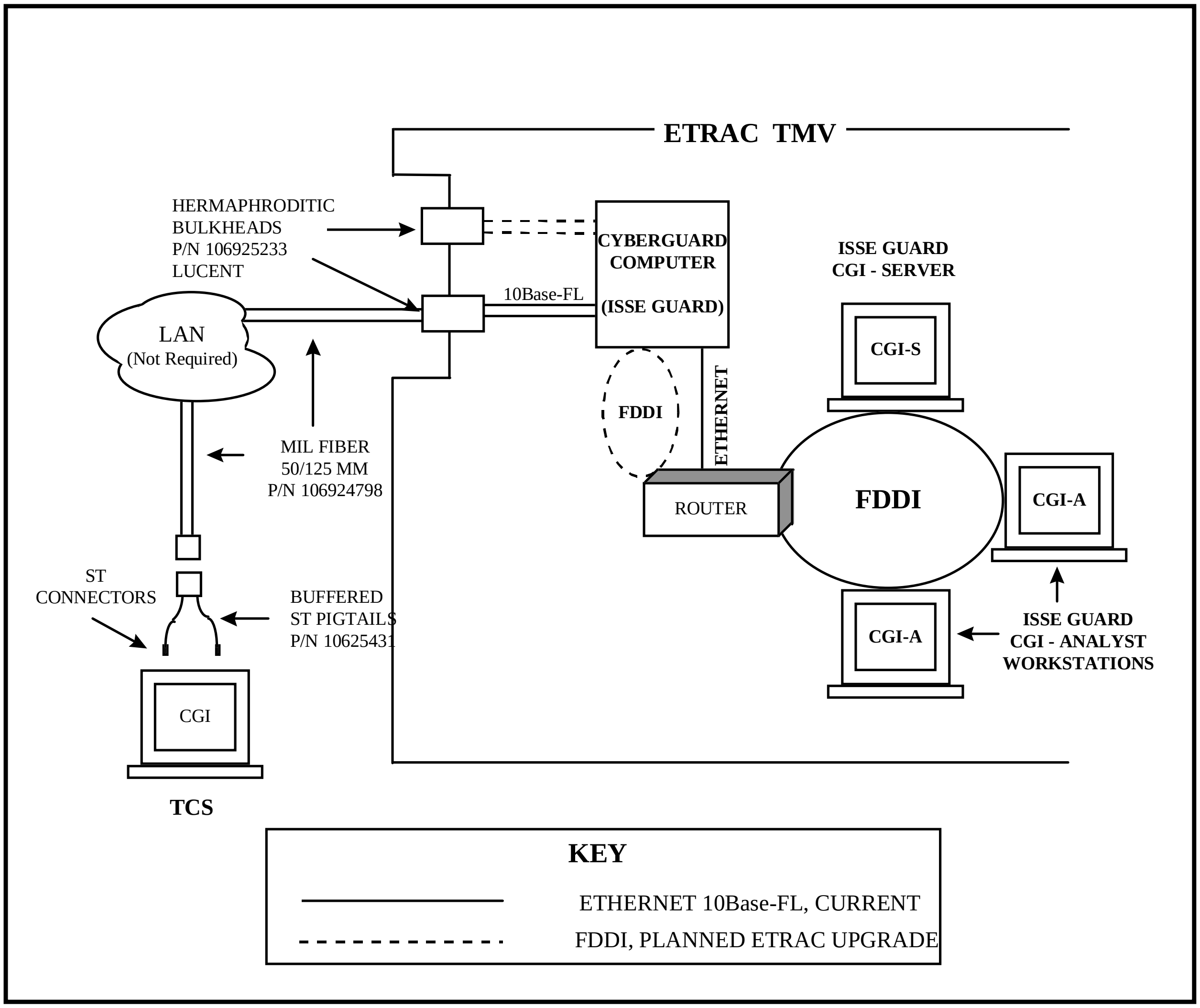

Figure 3.2.1-1 Unclassified TCS/ETRAC Connectivity Diagram

3.2.1.1 Physical Network Interface Characteristics

The ETRAC TMV egress panel contains hermaphroditic, two-conductor military fiber bulkheads made by Lucent Technologies, part number 106925233. This bulkhead will only mate to another compatible hermaphroditic military connector. Military two-strand fiber generally comes in 1000 meter and 3000 meter reels with hermaphroditic couplers terminated at both ends. TCS shall be required to provide one or more cable reels of military fiber to mate with the ETRAC egress panel [C4I218004]. This fiber is 50/125 micron core/cladding multi-mode graded index optical waveguide, part numbers 106924707 (1000 meter) and 106924715 (3000 meters) by Lucent Technologies. A back-to-back bulkhead coupler with two ST buffered pigtail connectors, part number 106925431, shall be used at the TCS interface to convert the military hermaphroditic connector to a commercial ST standard [C4I218005]. If Ethernet is to be used, then a 10Base-FL transceiver with ST couplers shall be provided to mate to the TCS Ethernet interface card [C4I218006]. If FDDI is to be used, then an FDDI dual attach or single attach station interface card with ST couplers shall be provided [C4I218007]. Inexpensive commercial off-the-shelf couplers are also available which can mate to the ST pigtails to convert the ST connector to any other desired commercial standard for an FDDI interface.

3.2.1.2 Media

The tactical military fiber media shall be 2-strand, 50/125 micron core/cladding, multi-mode fiber compatible with military specification MIL-C-49292 [C4I218008].

3.2.1.3 Electrical / Signal Characteristics

The data rate for the FDDI connection will be up to 100 Mbps, while the data rate for the Ethernet 10BASE-FL will be 10Mbps. All framing and electrical/optical standards shall comply with the Institute of Electrical and Electronic Engineers (IEEE) published standards for FDDI and Ethernet 10BASE-FL [C4I218009].

3.2.1.4 Encryption

For collocated operations, no encryption is required at this time.

3.2.1.5 ISSE Guard

ETRAC employs an ISSE Guard to provide proper security protection at the external network interface. The ISSE Guard is physically located in the ETRAC. The ISSE Guard System is composed of the Cyberguard computer henceforth called ISSE Guard, a Common Guard Interface-Server (CGI-S), one or more Common Guard Interface-Analyst (CGI-A) stations, and one or more Common Guard Interface (CGI) clients. The CGI-S and CGI-A are software applications residing on system high computers inside of ETRAC. The CGI client is a software application residing on TCS, as well as any other computers on the low [security] side which intend to send or receive data to or from ETRAC.

3.2.1.5.1 Data Flow: TCS to ETRAC

The CGI client software shall be installed on the TCS DII/COE platform [C4I2180010]. Once installed, an ETRAC directory shall be created on the TCS platform for dedicated ETRAC use [C4I218011]. The CGI software shall be configured to use the “auto” function option [C4I218012]. This option allows for user defined, automatic periodic polling of the ETRAC directory on TCS. At each period upon being polled, any and all files within the ETRAC directory will be automatically forwarded to the ISSE Guard. Reducing the period parameter increases processor usage, but reduces the probability of late data. The network interface between TCS and ISSE Guard may be Ethernet or FDDI as discussed in Section 3.2.1. The ISSE Guard re-packages each data file as an Simple Mail Transfer Protocol (SMTP) mail attachment and emails to the appropriate ETRAC workstation. All ETRAC workstations contain an SMTP mail package for reading of email.

3.2.1.5.2 Data Flow: ETRAC to TCS

ETRAC currently has three Sun workstations. One of these is designated the CGI Server and executes the CGI-S software. The other two workstations execute the CGI-A software. Data flow from any analyst station is CGI-A to CGI-S to ISSE Guard to TCS. Data flow from the server is simply CGI-S to ISSE Guard to TCS. The ISSE Guard packages each data file as an SMTP mail attachment and emails to TCS. The TCS shall be configured with an SMTP mail client to read ETRAC email messages and attachments[C4I218012]. The "UNIX Send Mail" application resident with most versions of UNIX is free and more than satisfactory.

3.2.2 Telephone Interface to ETRAC

The ETRAC system provides multiple telephone interfaces, both secure and non-secure, for the transmission of voice and occasional transmission of data. The telephone interfaces are of two types: commercial STU-III (analog) and tactical military (digital) via KY-68 Digital Subscriber Voice Terminal (DSVT). Both telephone units provide secure transmission of either voice or data, and each has unique interface requirements. A subscriber cannot create a secure transmission path between a STU-III and a KY-68 due to incompatibility problems. The two types of telephones are discussed below.

3.2.2.1 Interface to ETRAC via STU-III

A STU-III interface, from ETRAC or elsewhere, requires a two-wire analog loop which mates to the standard Public Switched Telephone Network (PSTN) using the Foreign Exchange Subscriber/Foreign Exchange Office (FXS/FXO), dual-tone multi-frequency (DTMF, or "touch-tone") standards. A single STU-III interface will support both voice and data connectivity, but not simultaneously. By connecting a STU-III to the PSTN, the subscriber may communicate with any other similarly keyed STU-III subscriber also connected to the PSTN. The DoD's arsenal of tactical telephone switches includes models which are commercially compatible and those which are not; consequently, a PSTN will not always be available in the field and STU-IIIs will not always be used. Even when a PSTN is unavailable in the field, STU-III telephones may be used across dedicated circuits to establish point-to-point links, or "hotlines". A point-to-point STU-III line could be established between ETRAC and the TCS controller[2] in these cases. TCS shall provide its own STU-III instrument and associated cabling to implement this interface [C4I218014].

3.2.2.2 Interface to ETRAC via KY-68 DSVT

A KY-68 interface, from ETRAC or elsewhere, requires a four-wire digital loop which mates to the DoD's Mobile Subscriber Equipment (MSE) using MSE standards for which there is no commercial equivalent. The data rates for KY-68 DSVT's are selectable from 16kbps or 32kbps. The operational scenario will dictate which data setting is to be used. As with the STU-III hotlines described above in Section 3.2.2.1, a pair of KY-68 DSVT's may also be directly

[2] In this scenario, ETRAC could communicate with TCS and vice versa, but neither party could use their STU-III to communicate to anyone else - - hence the term, "point to point". Dialing the telephone is not required on a point-to-point circuit - - simply lift the handset and the opposite phone immediately rings.

connected across a circuit to create a hotline. TCS shall provide its own KY-68 instrument and associated cabling to implement this interface [C4I218015].

3.2.2.3 Physical Telephone Interface Characteristics

Both the ETRAC and TCS systems have (or will have) the interface capability to connect to a commercially compatible analog telephone switch and a digital MSE field switch. The physical interfaces for both telephone units is unshielded twisted pair wiring, 26 American Wire Gage (AWG) or better, either one pair or two pair. The analog loop between a STU-III and the PSTN is always one twisted pair. The digital loop between a KY-68 and MSE is always two twisted pair. Tactical unshielded twisted pair cable may be used for either telephone. Tactical wiring is either type JK, or Field Wire. In field environments, the availability of such a telephone switch may be limited or non-existent. When STU-III's can be used, the supported data rate can be as high as 9.6 kbps.

3.2.2.4 Priority of Interface

(Not Applicable)

3.2.3 Mobile Subscriber Equipment

The US Army's MSE can provide an Ethernet network interface, and a four-wire digital KY-68 telephone interface, but it cannot provide an analog loop for STU-III interfacing. A COTS hardware conversion product is available from Motorola to provide STU-III to MSE interfacing in the field[3]. This STU-III to MSE conversion kit shall be provided by the TCS when needed [C4I218016].

3.2.4 Individual Data Element Characteristics

Data exchanged between the TCS and ETRAC shall include imagery, navigation plan, collection plan, mission status update and sensor retasking [C4I218017]. Table 3.2.4-1 describes the messages. The Format of the messages are defined in the following sections.

Table 3.2.4-1. TCS Message Formats for ETRAC

Message	Direction	Message Format	Paragraph
Imagery	TCS to ETRAC	NITF 2.0	3.2.4.1
Navigation Plan	TCS to ETRAC	ETRAC Format	3.2.4.2
Sensor Collection Plan	TCS to ETRAC	ETRAC Format	3.2.4.3
Mission Status Update	TCS to ETRAC	ETRAC Format	3.2.4.4
Sensor Retasking Request	ETRAC to TCS	ETRAC Format	3.2.4.5

[3] This conversion unit will not enable a STU-III to communicate to a KY-68 DSVT in secure mode. Secure communications capability is unchanged with the addition of the Motorola conversion product.

3.2.4.1 <u>Imagery</u>

The still imagery data from SAR, Electro-Optical (EO) and Infrared (IR) sensors shall be formatted in the NITF 2.0 format for transmission from the TCS to the ETRAC [C4I218018]. The NITF file contains header, subheader, and data fields. SDE shalll be provided with the imagery to the ETRAC if received with the imagery (i.e. HAE) [C4I218019]. If SDE are not received with the imagery, but are defined for the sensor, and if sufficient information is provided with the imagery, the TCS shall compute the SDE and attach it within the NITF file [C4I218020]. The following sections address the information to be supplied in the NITF file format and are provided here for completeness. For a complete definition of NITF, refer to MIL-STD 2500A.

The NITF file format is broken down into seven sections. Each of these sections is then subdivided into specific informational areas. See Figure 3.2.4.1-1 for a graphical representation of the NITF file format.

NITF File Header	**Images**	**Symbols**	**Labels**	**Text**	**Data Extension Segments**	**Reserved Segment (not used)**

Figure 3.2.4.1-1. NITF v2.0 Top Level File Format Representation

Note that TCS does not currently plan to use the Data Extension Segment trailer shown in Figure 3.2.4.1-1 for SDE sent to the ETRAC. This information is incorporated into the NITF file header Data Extension Segment Group (per MIL-STD 2500A) as shown in Figure 3.2.4.1.1-1.

3.2.4.1.1 <u>NITF File Header</u>

Each NITF file begins with a file header, whose fields contains identification and origination information, file level security information, and the number and size of data items of each type contained in the file. The NITF 2.0 File Header is graphically represented in Figure 3.2.4.1.1-1. The subdivisions of the File Header, group the required information into specific subheadings allowing for the search and retrieval of specific information in an organized manner. The TCS shall be responsible for generating the NITF header for the image when necessary [C4I218021].

The NITF Header Fields are byte aligned. Appendix A Table A-1 provides additional details of the header contents. Complete detail is found in Mil-Std 2500A

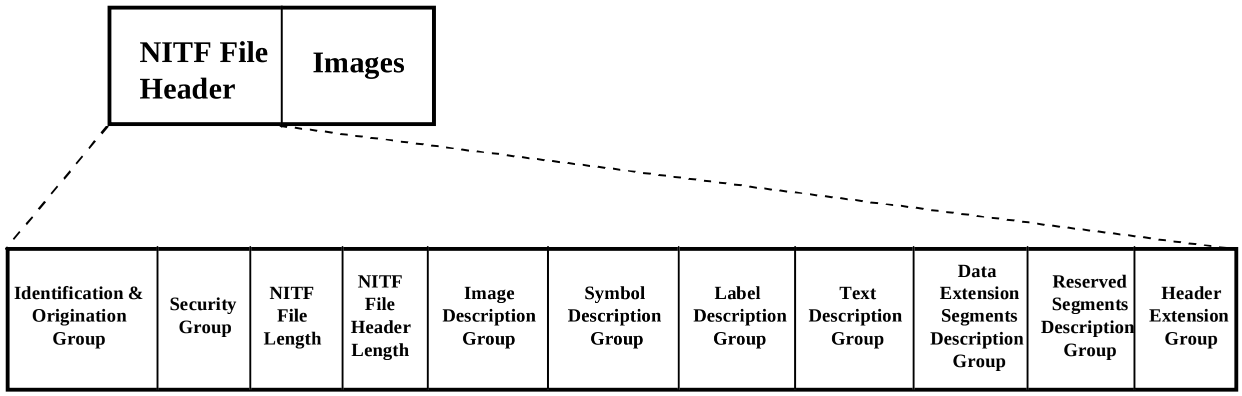

Figure 3.2.4.1.1-1. NITF File Header Breakdown

3.2.4.1.2 NITF File Images

Each image in the NITF file will be preceded with an Image Subheader. In the Image Subheader, the NITF 2.0 Specification provides for the expansion of data to identify the base image as well as up to 998 subimages within that base image. The nine categories of information in the Image Subheader describe the base or subimage. Figure 3.2.4.1.2-1 provides a graphical representation of the Image breakdown.

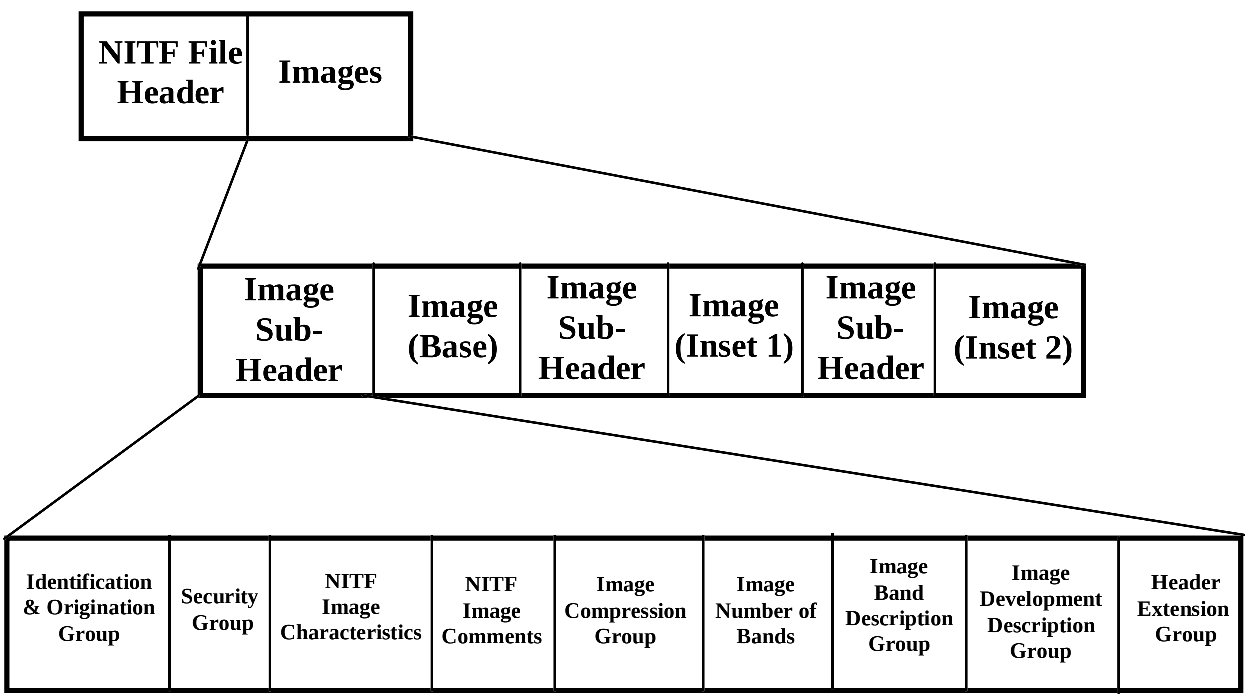

Figure 3.2.4.1.2-1. NITF File Format - Images Graphical Breakdown

The information in the Image Subheader fields are ASCII encoded character data. The sub header contains information pertaining to that particular data item only. They provide information about the image source and characteristics needed to display and interpret the image properly.

The TCS shall generate the NITF subheader, including the appropriate SDE, if necessary, and format the image [C4I218022]. The TCS images sent to ETRAC shall consist of eight - bit monochrome pixels [C4I218023]. Appendix A Table A-2 provides additional details of the image subheader contents.

3.2.4.2 Navigation Plan

This section presents the data contents and format for the Navigation Plan Message. This file will be generated in the TCS based on the Navigation Plan of the UAV. The Navigation Plan shall be provided to ETRAC to give them the capability to plan for and monitor the mission [C4I218024]. If any of the fields in the Navigation Plan changes after the initial plan is sent, the TCS can send an update.

This file provides the navigation plan that is used by ETRAC for theater airborne platforms. Table 3.2.4.2-1 provides the content of the Navigation Plan. All characters shall be in ASCII format [C4I218025]. Numeric fields are right justified and normally blank filled. Leading zeros may be used where they avoid ambiguities. Alphanumeric fields are left justified and are blank filled. For the Destination Point (DP) numbers, both the previous DP and next DP are included. This allows for the creation of a "linked list" which can easily accept additions or deletions without modification of the entire plan.

Table 3.2.4.2-1. Navigation Plan Message

Element Name	Field Length (Bytes)	Description
Sender ID	9	Name or Acronym of the system from which the plan is being sent.
Recipient ID	9	Name or Acronym of the system to which the plan is being sent. Typically "ETRAC" for this application
Message ID	1	Type of message, in this case, it will always be "1" which indicates "Navigation Plan".
Message Length	6	Length of the Nav Plan message in bytes
Communications Software ID	4	Communications software version ID where ID = 1 for the first version and is incremented by 1 thereafter when message format changes. Currently "1".
Message Classification	1	Message Classification Unclassified = 1 Confidential = 2 Secret = 3
Message Format Version ID	3	Message Format version ID where ID = 1 for the first version and is incremented by 1 thereafter when message format changes. Currently "1".

Table 3.2.4.2-1. Navigation Plan Message (cont'd)

Element Name	Field Length (Bytes)	Description
Mission ID	6	Mission ID YYJJJN, where: YY = Last digits of the year JJJ = Julian Date N = Flight/Sortie Number
Navigation Plan Sequence Number	3	The version of the Nav Plan. The original will always have sequence number 000 and each subsequent version will be incremented by one. Range from 000 to 999.
Number of Destination Points	2	Number of DPs in this Nav Plan. Range from 1 to 99
Note: The following is repeated for each DP		
Destination Point	2	Number of this DP in Nav Plan. Range from 1 to 99
Next DP	2	Number of the next DP
Previous DP	2	Number of the previous DP
Altitude	5	Altitude of the Aircraft at the DP in feet above mean sea level (FFFFF)
Turn Radius	5	Turning radius of the aircraft expressed in nautical miles (MMM.M)
Time of Arrival	6	Estimated Time of Arrival at DP (HHMMSS) in GMT, where: HH = Hours MM = Minutes SS = Seconds
Latitude of DP	9	Latitude of the DP in Geographic Coordinates - DDMMSSCCH where DD = Latitude in degrees MM = Latitude in Minutes SS = Latitude in Seconds CC = latitude in hundredths of a second H = Hemisphere of Latitude (N/S)
Longitude of DP	10	Longitude of the DP in Geographic Coordinates - DDDMMSSCCH where DDD = Longitude in Degrees MM = Longitude in Minutes SS = Longitude in seconds CC = latitude in hundredths of a second H = Hemisphere of Longitude (E/W)

3.2.4.3 Sensor Collection Plan

This section presents the data contents and format for the Sensor Collection Plan (see Table 3.2.4.3-1). This file will be generated in the TCS based on the mission plan of the air vehicles. The Sensor Collection Plan Message shall be provided to ETRAC to give them the capability to plan for and monitor the mission [C4I218026]. If any of the fields in the Collection Plan changes after the initial plan is sent, the TCS can send an update.

All characters shall be in ASCII format [C4I218027]. Numeric fields are right justified and normally blank filled. Leading zeros may be used where they avoid ambiguities. Alphanumeric fields are left justified and are blank filled. For the Scene Number, both the previous scene and next scene are included. This allows for the creation of a "linked list" which can easily accept additions or deletions without modification of the entire plan.

Table 3.2.4.3-1. Sensor Collection Plan Message Format

Element Name	Field Length (Bytes)	Description
Sender ID	9	Name or Acronym of the system from which the plan is being sent.
Recipient ID	9	Name or Acronym of the system to which the plan is being sent. Typically "ETRAC" for this application
Message ID	1	Type of message, in this case, it will always be "2" which indicates "Sensor Collection Plan".
Message Length	6	Length of the collection plan message in bytes
Communications Software ID	4	Communications software version ID where ID = 1 for the first version and is incremented by 1 thereafter when message format changes. Currently "1".
Message Classification	1	Message Classification Unclassified = 1 Confidential = 2 Secret = 3
Message Format Version ID	3	Message Format version ID where ID = 1 for the first version and is incremented by 1 thereafter when message format changes. Currently "1".
Mission ID	6	Mission ID YYJJJN, where: YY = Last digits of the year JJJ = Julian Date N = Flight/Sortie Number
Plan Sequence Number	3	The version of the sensor collection plan. The original will always have sequence number 000 and each subsequent version will be incremented by one. Range from 000 to 999.
Number of Scenes	3	Total number of scenes in this collection plan. Range from 1 to 999
Note: The following is repeated for each DP		
Scene Number	3	Scene number in the form of NNN, where NNN= 1 - 511
Destination Point	2	Number of this DP in Nav Plan associated with this collection. Range from 1 to 99
Scene Mode	1	Type of sensor being used, where 5 = Video 6 = Electro-Optic (EO) 7 = Infrared (IR) 8 = SAR
Map Angle	3	Map angle from broad side of the air vehicle to the area being imaged in degrees

Table 3.2.4.3-1. Sensor Collection Plan Message Format (cont'd)

Element Name	Field Length (Bytes)	Description
Previous Scene Number	3	Scene Number of the previous scene in the linked list
Next Scene Number	3	Scene Number of the next scene in the linked list
Reserved	1	Not used for TCS, set to "0" (zero).
Scene Entry Latitude	9	Entry (beginning) latitude of the scene in the form of DDMMSSCCH, where: DD = Latitude in degrees MM = Latitude in Minutes SS = Latitude in Seconds CC = latitude in hundredths of a second H = Hemisphere of Latitude (N/S)
Scene Entry Longitude	10	Entry (beginning) longitude of the scene in the form of DDDMMSSCC, where: DDD = Latitude in degrees MM = Latitude in Minutes SS = Latitude in Seconds CC = latitude in hundredths of a second H = Hemisphere of Latitude (N/S)
Scene Exit Latitude	9	Exit (ending) latitude of the scene in the form of DDMMSSCCH, where: DD = Latitude in degrees MM = Latitude in Minutes SS = Latitude in Seconds CC = latitude in hundredths of a second H = Hemisphere of Latitude (N/S)
Scene Exit Longitude	10	Exit (ending) longitude of the scene in the form of DDDMMSSCC, where: DDD = Latitude in degrees MM = Latitude in Minutes SS = Latitude in Seconds CC = latitude in hundredths of a second H = Hemisphere of Latitude (N/S)
Scene Entry Elevation	5	Starting elevation of the scene collection at the scene entry in the form of ZNNNN, where Z is the sign (+ or-) and NNNN is the altitude in feet.
Scene Exit Elevation	5	Ending elevation of the scene collection at the scene entry in the form of ZNNNN, where Z is the sign (+ or-) and NNNN is the altitude in feet.
Time of Collection	6	Estimated time at which the air vehicle will begin collecting the scene (HHMMSS) in GMT, where: HH = Hours MM = Minutes SS = Seconds
Scene Time	4	Estimated time it will take to collect imagery in seconds
Gap Time	4	estimated time between the end of this scene collection and the beginning of the next scene collection

Table 3.2.4.3-1. Sensor Collection Plan Message Format (cont'd)

Element Name	Field Length (Bytes)	Description
Reserves	1	Not used for TCS, but set to "2"
Scene Change Indicator	1	Flag to indicate if this is a new scene or if any of the collection parameters have changed. 0 = changes in the scene time or gap time 1 = changes in the time of collection 2 = for all scenes in the original (first) collection plan

3.2.4.4 Mission Status Update

Mission Status Update is data from the aircraft that provides time tagged location and velocity information for the air vehicle. This information can be used by the ETRAC to determine the current position of the air vehicle and to help determine the validity of retasking requests. The TCS will generate the Mission Status Update for the ETRAC. The Mission Status Update message shall be sent to the ETRAC [C4I218028]. All characters shall be in ASCII format [C4I218029]. The format of the mission status data is shown in Table 3.2.4.4-1.

Table 3.2.4.4-1. Mission Status Update Message File Format

Element Name	Field Length (Bytes)	Description
Format	4	Data format, 1=standard flight condition data
Number	4	Current record number, 1 to n
Rate	4	Rate of transmission, default rate=1Hz
Day	4	Julian date (OJJJ)
Year	4	Year
Time	4	GMT (HHMM)
Latitude	8	Aircraft latitude, in radians
Longitude	8	Aircraft longitude, in radians
Altitude	8	Aircraft altitude, in feet above mean sea level
Velocity North	8	Aircraft velocity north, in meters/sec
Velocity East	8	Aircraft velocity east, in meters/sec
Velocity Down	8	Aircraft velocity down, in meters/sec
Ground Speed	8	Aircraft ground speed, in meters/sec
True Heading	8	Aircraft true heading, in radians
Track Heading	8	Track heading, in radians
Nav Time Tag	8	Nav time tag
Destination Point	4	Destination point

3.2.4.5 Sensor Retasking Request

ETRAC will be able to generate a retasking request for the sensor. This sensor retasking request will not be able to control the air vehicle flight path, rather it will only be able to request a change in the sensor imaging mode and pointing direction. TCS shall be able to accept message and provide the TCS operator the opportunity to react to ETRAC's request [C4I218030]. Table 3.2.4.5-1 provides the definition of the ETRAC to TCS Sensor Retasking Message.

Table 3.2.4.5-1. ETRAC Sensor Retasking Message

Word	Name	Description	Comments
1	ID	Platform Identification	
2	Mode	Sensor imaging mode	
3	Scene Number		
4-5	Latitude	Scene Latitude	radians
6-7	Longitude	Scene longitude	radians
8	Altitude	CCRP Altitude	Feet

3.2.5 Communication Methods Characteristics

(Not Applicable)

3.2.6 Protocol Characteristics

3.2.6.1 SMTP

E-mail shall be supported using Simple Mail Transfer Protocol (SMTP) in accordance with Internet Engineering Task Force (IETF) Request for Comments (RFC) 0821. This protocol is layered on the TCP/IP protocol.

3.2.7 Other Characteristics

(Not Applicable)

4. Requirements Traceability and Qualification Provisions

This section defines the traceability of each C^4I requirement in this IDD, as shown in Table 4.0-1 below, to the TCS SSDD requirements specified in the TCS SSDD Baseline Version 1.0. This section also defines the qualification methods to be used to ensure that each requirement of this interface has been met. These qualification methods are defined as:

D	Demonstration	The operation of the interfacing entities that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis.
T	Test	The operation of the interfacing entities using instrumentation or special test equipment to collect data for later analysis.
A	Analysis	The processing of accumulated data obtained from other qualification methods. Examples are reduction, interpretation, or extrapolation of test results.
I	Inspection	The visual examination of code, documentation, etc.
S	Special	Any special qualification methods such as special tools, techniques, procedures, facilities, and acceptance limits.

Table 4.0-1 lists each requirement of the TCS to ETRAC interface with its C^4I IDD requirement number, traceability to the SSDD, the IDD paragraph number where the requirement is found, and the qualification method.

Table 4.0-1. TCS to ETRAC Requirements Traceability and Qualification Methods

IDD Requirement Number	Requirement	Paragraph	SSDD Requirement	Qualification Method
C4I218001	Ethernet NIC	3.2.1	TBD	I (TBR)
C4I218002	FDDI NIC	3.2.1	TBD	I (TBR)
C4I218003	Detachable 10Base-FL transceiver	3.2.1	TBD	I (TBR)
C4I218004	Hermaphroditic tactical military fiber and connector	3.2.1.1	TBD	I, D (TBR)
C4I218005	ST buffered pig-tail connection	3.2.1.1	TBD	I (TBR)
C4I218006	10 BASE-FL transceiver	3.2.1.1	TBD	I (TBR)
C4I218007	FDDI Interface card	3.2.1.1	TBD	I (TBR
C4I218008	2 strand 50/125 micron multi-mode fiber, MIL-C-49292 compatible	3.2.1.2	TBD	I, D (TBR)
C4I218009	IEEE framing and optical standards for FDDI and Ethernet 10Base -FL	3.2.1.3	TBD	D(TBR)
C4I218010	ISSE Common Guard Interface Software	3.2.1.5.1	TBD	D (TBR)

Table 4.0-1. TCS to ETRAC Interface Requirements and Qualification Methods (cont'd)

IDD Requirement Number	Requirement	Paragraph	SSDD Requirement	Qualification Method
C4I218011	Dedicated ETRAC directory	3.2.1.5.1	TBD	D (TBR)
C4I218012	CGI configured for auto function	3.2.1.5.1	TBD	D (TBR)
C4I218013	SMTP compliant e-mail	3.2.1.5.2	TBD	D (TBR)
C4I218014	TCS provides own Stu-III and cabling	3.2.2.1	TBD	I (TBR)
C4I218015	TCS provides KY-68 equipment and cabling	3.2.2.2	TBD	I (TBR)
C4I218016	TCS provides STU-III to MSE conversion equipment	3.2.3	TBD	I (TBR)
C4I218017	Data Exchange a) Imagery b) Navigation Plan c) Sensor collection Plan d) Mission Status Update Retasking Request	3.2.4	TBD	D (TBR)
C4I218018	NITF Formatted Imagery	3.2.4.1	TBD	D (TBR)
C4I218019	Pass SDE within the NITF file to ETRAC when received with the imagery	3.2.4.1	TBD	D (TBR)
C4I218020	Compute and attach SDEs within NITF file	3.2.4.1	TBD	D (TBR)
C4I218021	Generate NITF header	3.2.4.1.1	TBD	D (TBR)
C4I218022	Generate NITF subheader and SDE	3.2.4.1.2	TBD	D (TBR)
C4I218023	8-bit monochrome imagery	3.2.4.1.2	TBD	D (TBR)
C4I218024	Nav Plan provided to ETRAC	3.2.4.2	TBD	D (TBR)
C4I218025	Nav Plan in ASCII format	3.2.4.2	TBD	D (TBR)
C4I218026	Sensor Collection Plan provided to ETRAC	3.2.4.3	TBD	D (TBR)
C4I218027	Sensor Collection Plan in ASCII format	3.2.4.3	TBD	D (TBR)
C4I218028	Mission Status update provided to ETRAC	3.2.4.4	TBD	D (TBR)
C4I218029	Mission Status Update in ASCII format	3.2.4.4	TBD	D (TBR)
C4I218030	TCS accept sensor retasking requests from ETRAC	3.2.4.5	TBD	D (TBR)

5. Notes

5.1 Background Information

5.1.1 ETRAC Mission Statement

The Primary Mission of the ETRAC is to provide the Army field commander with accurate, reliable, and timely, imagery-based, battlefield intelligence derived from the collections made by the all-weather, high-resolution, Advanced Synthetic Aperture Radar System-2 (ASARS-2) radar-sensor carried on-board the U-2 reconnaissance aircraft. To accomplish its mission, the ETRAC must be capable of the direct-receipt of ASARS-2 Synthetic Aperture Radar (SAR) data, the near-real-time processing of the received SAR data into soft-copy digital imagery, the exploitation of that imagery into imagery-based intelligence products, and the assured dissemination of those products to the user. To accomplish its mission in a worldwide tactical environment, the ETRAC system is mobile, air-transportable by no more than two C-130 aircraft, requires no special loading/unloading equipment, has its own integral electric power source, and is self-sufficient for at least 14 days. Additional transport and aircraft are required for deployments of extended duration and to accommodate equipment and crew added for specific mission requirements.

The ETRAC also provides an inherent comprehensive mission planning (navigation and collection planning) and robust communications capability, which includes communicating with the aircraft pilot and performing dynamic retasking of the ASARS-2 sensor. Although the ETRAC's ability to accommodate other sensors is a secondary mission, they take on increased importance during the times when the U-2/ASARS-2 is not operating.

5.1.2 ETRAC System Description

ETRAC is designed to be tactical and self-sufficient in a worldwide combat environment. It is capable of rapid tear-down and set-up. It has an integral, rapidly deployable generator. Each van has its own self-contained Environmental Control Unit (ECU). It is ground mobile at highway speeds on public roads and at reduced speeds on unimproved roads.

The ETRAC system consists of the Tactical Mission Van (TMV), the Tactical Support Van (TSV), and the Surface Antenna Group (SAG) Data Link Antenna. The system includes two dedicated prime movers required to deploy the vans (TMV and TSV) and the trailered SAG. A diesel generator is provided in the TSV for field deployment and to serve as a backup for commercial power.

The ETRAC can function as necessary to serve as the operational backup for selected mission planning functions to the Main Operating Base (MOB)/Forward Operating Location (FOL), or as the primary U-2 ground station for contingency deployments. The ETRAC crew consists of twelve (12) personnel of mixed skill levels, to perform supervision, data link control, mission planning, imagery exploitation, and first level maintenance.

Major ETRAC functions are commonly identified as:

- Receipt, processing and generation of Collection Requests
- Mission Planning: develop Navigation/Collection Plans
- Receipt of ASARS-2 data via ETRAC-Modularized Interoperable Surface Terminal (MIST) data link
- Processing ASARS-2 data into digital imagery
- Exploitation of processed digital imagery and data base storage
- Generation/Dissemination of imagery-based intelligence products

ETRAC is designed to be versatile. It can be co-deployed with an Army full-capability exploitation system such as the Modernized Imagery Exploitation System (MIES) or deployed in a standalone mode. When connected via a fiber-optic cable to a MIES, the ETRAC can directly transfer digital-imagery data to the MIES. In the standalone mode of operation, ETRAC can perform limited exploitation of the collected and processed imagery data to produce imagery-based intelligence products that include reports, secondary imagery, and special products.

ETRAC makes maximum use of Commercial Off the Shelf (COTS) and government furnished hardware and software. It is migrating to a fully CIG/SS compliant open-architecture based on UNIX. Designed to accommodate the future EO/IR sensor and advanced SAR sensor processing requirements you will see in reading about ongoing Pre-Planned Product Improvement efforts, that this earlier intent in the design efforts is already being taken advantage of. It was designed to be reliable (3000 hour Mean Time Between Failure (MTBF)) and maintainable (one-hour Mean Time To Repair (MTTR)), and is expected to be viable for a ten year operational lifetime.

5.1.3 ETRAC Current Operating Scenario - Assumptions

ETRAC's primary mission is the receipt, processing, exploitation, and reporting of the U-2 ASARS-2 collected imagery. It is anticipated that the U-2 will be committed in support of the ETRAC when it is deployed. All other sources, operations or capabilities of ETRAC are subordinated to the U2/ASARS mission. As such, the impact of reconfiguration of ETRAC for the purpose of link acquisition, processing, and exploitation from U-2/ASARS-2 to another source is of great importance to the ETRAC and the operating command. Ultimately, the desired integration of any additional capability, to include HAE-UAV, must result in reconfiguration requirements that are considered insignificant or manageable, and will not jeopardize or cause the loss of an ASARS-2 mission or other collection efforts identified with ETRAC's primary mission requirements.

ETRAC will be called upon to support an early entry deployment scenario in a contingency deployment. It is designed to compete favorably for space on early airlift. The equipment which is chosen to be used in support of ETRAC will likewise have to compete favorably for space for early deployment. It is anticipated that in a given deployment, ETRAC will have an established priority for being collocated with such equipment as the HAE UAV Mission Control Element (MCE), the TROJAN SPIRIT, and the All Source Analysis System (ASAS). It would also require a means for receiving dedicated support from an Automatic Digital Information Network (AUTODIN) Switching center, or from Mobile Subscriber Equipment (MSE) services. It is anticipated that ETRAC will have an assigned 25kHz channel allocated for its use over Ultra High

Frequency (UHF) Satellite Communications (SATCOM). If associated equipment such as that listed above is not deployed forward with ETRAC, it is expected that other communications means to bridge the distances of separation will be provided.

ETRAC will rely on its integrated communications capabilities, i.e., UHF Line of Sight (LOS)/SATCOM, Public Switch Telephone Network (PSTN), and low rate AUTODIN. If necessary, ETRAC will commit to courier/hand-carry of disk media, or hard copy to exchange or distribute data. It is assumed that collection management and collection authorities which control ETRAC are committed in support of the deployment and that they will serve to communicate with Joint Task Force (JTF) or theater level counterparts. ETRAC is not expected, unless specifically directed, to communicate directly with JTF or theater level agencies/systems/organizations other than when it disseminates reports or other imagery derived products. Dedicated support to these adjacent systems, such as by “hardwire” and face-to-face coordination when they are collocated, is preferred over “windowing” into them through a shared network.

5.2 Acronyms and Abbreviations.

ACS	Aerial Common Sensor
ADT	Air Datalink Terminal
AFATDS	Advanced Field Artillery Tactical Data System
AFMSS	Air Force Mission Support System
AMPS	Army Mission Planning System
ASARS-2	Advanced Synthetic Aperture Radar System - 2
ASAS	All-Source Analysis System
ATHS	Automated Target Hand-off System
ATM	Asynchronous Transfer Mode
ATWCS	Advance Tomahawk Weapons Control System
AUTODIN	Automatic Digital Information Network
AV	Air Vehicle
AWG	American Wire Gage
C^4I	Command, Control, Communication, Computers and Intelligence
CARS	Contingency Airborne Reconnaissance System
CCTV	Closed- Circuit Television
CGI	Common Guard Interface
CGS	Common Ground Station
CIGSS	Common Imagery Ground/Surface System
COE	Common Operating Environment
COMPASS	Common Operational Modeling, Planning, and Simulation System
COSIP	Computer Open Systems Interface Processor
COTS	Commercial-off-the-shelf
CSARP	Common Synthetic Aperture Radar Processor
DAS	Dual Attach Station
DAS-C	Defense ATM Services - Collateral
DCGS	Distributed Common Ground Station

DES	Data Extension Segments
DID	Data Item Description
DII	Defense Information Infrastructure
DL	Data Link
DoD	Department of Defense
DP	Destination Point
DPS	Digital Products Server
DSVT	Digital Subscriber Voice Service
DTMF	Dual Tone Multi-Frequency
ECU	Environmental Control Unit
EO/IR	Electro Optic/Infrared
ETRAC	Enhanced Tactical Radar Correlation
FDDI	Fiber Distributed Data Interface
FOL	Forward Operating Location
FXS/FXO	Foreign Exchange Subscriber / Foreign Exchange Office
GDT	Ground Datalink Terminal
GFE	Government Furnished Equipment
GSM	Ground Station Module
HAE	High Altitude Endurance (Tier II Plus and Tier III Minus)
HCI	Human Computer Interface
IAS	Intelligence Analysis System
IDD	Interface Design Description
IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
IPF	Integrated Processing Facility
IRS	Interface Requirements Specification
ISSE	Imagery Support Server Environment
JDISS	Joint Deployable Intelligence Support System
JII	Joint Interoperability Interface
JMCIS	Joint Maritime Command Information System
JSIPS	Joint Service Imagery Processing System
JSIPS-N	Joint Service Imagery Processing System - Navy
JSTARS	Joint Surveillance Target Attack Radar System
JTA	Joint Technical Architecture
JTF	Joint Tactical Forces
LAN	Local Area Network
LOS	Line of Sight
LRIP	Low Rate Initial Production
MAE	Medium Altitude Endurance
MCE	Mission Control Element (a HAE Segment)
MIES	Modernized Imagery Exploitation System
MIST	Modularized Interoperable Surface Terminal
MOB	Main Operating Base
MSE	Mobile Subscriber Equipment
MTBF	Mean Time Between Failure

MTTR	Mean time to Repair
NIC	Network Interface Card
NITFS	National Imagery Transmission Format Standard
ORD	Operational Requirements Specification
PSTN	Public Switch Telephone Network
SAG	Surface Antenna Group
SAR	Synthetic Aperture Radar
SAS	Single Attach Station
SATCOM	Satellite Communications
SCI	Sensitive Compartmented Information
SDE	Support Data Extension
SIPRNET	Secret Internet Protocol Network
SMTP	Simple Mail Transfer Protocol
SPIRIT	Special Purpose Integrated Remote Intelligence Terminal
SRD	Systems Requirements Document
SSDD	System / Subsystem Design Document
SSS	System / Subsystem Specification
TAMPS	Tactical Afloat Mission Planning System
TBD	To Be Determined
TBMCS	Theater Battle Management Core System
TBS	To Be Supplied
TCP	Transmission Control Protocol
TCS	Tactical Control System
TEG	Tactical Exploitation Group
TES	Tactical Exploitation System
TMV	Tactical Mission Van (ETRAC)
TSV	Tactical Support Van (ETRAC)
TUAV	Tactical Unmanned Aerial Vehicle
UAV	Unmanned Aerial Vehicle
UAV JPO	Unmanned Aerial Vehicle Joint Program Office
UHF	Ultra High Frequency (300 -1000 MHz)
VMF	Variable Message Format

Appendix A
NITF Header and Subheader Tables

The following tables are extracted from the Mil-STD 2500A and are provided here only for completeness of this IDD.

Table 5.2.4.1.1-1. NITF File Header

FIELD	NAME	SIZE	VALUE RANGE	TYPE
NITF File Header: Identification & Origination Group				
FHDR	File Type & Version	9	NITFNN.NN	R
CLEVEL	Compliance Level	2	1 - 99	R
STYPE	System Type	4	Reserved	O
OSTAID	Originating Station ID	10	Alphanumeric	R
FDT	File Date & Time	14	DDHHMMSSZMONYY	R
FTITLE	File Title	80	Alphanumeric	O
NITF File Header: Security Group				
FSCLAS	File Security Classification	1	T, S, C, R, U	R
FSCODE	File Code Words	40	Alphanumeric	O
FSCTLH	File Control and Handling	40	Alphanumeric	O
FSREL	File Releasing Instructions	40	Alphanumeric	O
FSCAUT	File Classification Authority	20	Alphanumeric	O
FSCTLN	File Security Control Number	20	Alphanumeric	O
FSDWNG	File Security Downgrade	6	Alphanumeric	O
FSCOP	Message Copy Number	5	0 - 99999	O
FSCPYS	Message Number of Copies	5	0 - 99999	O
ENCRYP	Encryption	1	0=Not Encrypted 1=Encrypted	R
ONAME	Originator’s Name	27	Alphanumeric	O
OPHONE	Originator’s Phone Number	18	Alphanumeric	O
NITF File Header: NITF File Length				
FL	File Length	12	0 - 999999999999	R
NITF File Header: NITF File Header Length				
HL	NITF File Header Length	6	0 - 999999	R
NITF File Header: Image Description Group				
NUM1	Number of Images	3	0 - 999	R
LISH0001	Length of 1st Image Subheader	6	0 - 999999	C
LI001	Length of 1st Image	10	0 - 9999999999	C
NITF File Header: Symbol Description Group				
NUMS	Number of Symbols	3	0 - 999	R
NITF File Header: Label Description Group				
NUML	Number of Labels	3	0 - 999	R
NITF File Header: Text Description Group				
NUMT	Number of Text Files	3	0 - 999	R
NITF File Header: Data Extension Segments Description Group				
NUMDES	Number of Data Extension Segments	3	0 - 999	R
NITF File Header: Reserved Segments Description Group				
NUMRES	Number of Reserved Extension Segments	3	0 - 999	R
NITF File Header: Header Extension Group				
UDHL	User Defined Header Data Length	5	0 - 99999	R
XHDL	Extended Header Data	5	0-999999	R

Table 5.1.3.1.2-1. NITF Image Subheader File Content

FIELD	NAME	SIZE	VALUE RANGE	TYPE
Image: Images Subheader: Identification & Origination Group				
IM	File Part Type	2	IM	R
IID	Image ID	10	Alphanumeric	R
IDATIM	Image Date & Time	14	DDHHMMSSZMONYY	O
TGTID	Target ID	17	BBBBBBBBBBFFFFFC C	O
ITITLE	Image ID	80	Alphanumeric	O
Image: Images Subheader: Security				
ISCLAS	Image Security Classification	1	T, S,C, R, or U	R
ISCODE	Image Codewords	40	Alphanumeric	O
ISCTLH	Image Control and Handling	40	Alphanumeric	O
ISREL	Image Releasing Instructions	40	Alphanumeric	O
ISCAUT	Image Classification Authority	20	Alphanumeric	O
ISCTLN	Image Security Control Number	20	Alphanumeric	O
ISDWNG	Image Security Downgrade	6	Alphanumeric	O
ENCRYP	Encryption	1	0 = Not Encrypted 1 = Encrypted	R
Image: Images Subheader: NITF Image Characteristics				
ISORCE	Image Source	42	Alphanumeric	O
NROWS	Number of Significant Rows in Image	8	0 - 99999999	R
NCOLS	Number of Significant Columns in Image	8	0 - 99999999	R
PVTYPE	Pixel value type	3	Alphanumeric	R
IREP	Image Representation	8	Alphanumeric	R
ICAT	Image Category	8	Alphanumeric	R
ABPP	Actual Bits-Per-Pixel Per Band	2	1 - 64	O
PJUST	Pixel Justification	1	L or R	O
ICORDS	Image Coordinate	1	U, G, C, or N	R
IGEOLO	Image Geographic Location	60	ddmmssXdddmmssY (four times) or, ggXYZmmmmmmmmmm (four times)	C
Image: Images Subheader: NITF Image Comments				
NICOM	Number of Image Comments	1	0 - 9	R
ICOM1	Image Comment 1	80	Alphanumeric	C
Image: Images Subheader: Image Compression Group				
IC	Image Compression	2	NC, or C0 - C3	R
COMRAT	Compression Rate Code	4	Alphanumeric	C
Image: Images Subheader: Image Number of Bands				
NBANDS	Number of Bands	1	1 - 9	R
Image: Images Subheader: Image Band Description Group				
IREPBAND1	1st Band Representation	2	Alphanumeric	R
ISUBCAT1	1st Band Significance for Image Category	6	Alphanumeric	R
IFC1	1st Band Image filter Condition	1	N	R
IMFLT1	1st Band Standard Image Filter Code	3	Reserved	R
NLUTS1	1st Band Number of LUTS	1	0 - 4	R

Table 5.1.3.1.2-1. NITF Image Subheader File Content (cont'd)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
Image: Images Subheader: Image Development Description Group				
ISYNC	Image Sync Code	1	0 or 4	R
IMODE	Image Mode	1	B, P, S	R
NBPR	Number of Blocks Per Row	4	1 - 9999	R
NBPC	Number of Blocks Per Column	4	1 - 9999	R
NPPBH	Number of Pixels Per Block Horizontal	4	1 - 9999	R
NPPBV	Number of Pixels Per Block Vertical	4	1 - 9999	R
NBPP	Number of Bits Per Pixel Per Band	2	1 - 64	R
IDLVL	Display Level	3	1 - 999	R
IALVL	Attachment Level	3	0 - 998	R
ILOC	Image Location	10	rrrrrccccc	R
IMAG	Image Magnification	4	Alphanumeric	R
Image: Images Subheader: Header Extension Group				
UDIDL	User Defined Image Data Length	5	0 - 99999	R
IXSHDL	Extended Subheader Data Length	5	0 - 99999	R
IXSOFL	Tagged Record Overflow Pointer into DES	3	0 - 999	C